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Political Institutionalisation and Economic Specialisation in Polycentric Metropolitan Regions – The Case of the East-German 'Saxony Triangle'

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Abstract

The rising attention of politicians as well as scientists in the EU to the large urban agglomerations as centres of economic growth is accompanied by political efforts to identify and to demarcate such agglomerations under the label 'metropolitan regions'. This study develops a theoretical framework broaching the issue of cooperation between municipalities from the perspective of regional economics as well as political science. The framework is applied to the empirical case of the polycentric metropolitan region 'Saxony Triangle' in East Germany. The results show that various intervening factors prevent intense cooperation between the actors in the region. Policy implications and conclusions for future research are discussed.

Key Words: Polycentric Urban Regions, Metropolitan Regions, Saxony Triangle, Cooperation, Agglomeration, Correspondence Analysis

JEL: R12, R53, R58

Politische Institutionalisierung und ökonomische Spezialisierung in polyzentrischen Metropolregionen – Das Beispiel des ostdeutschen „Sachsendreiecks“

Zusammenfassung

Die zunehmende Aufmerksamkeit, die große städtische Agglomerationen als Zentren wirtschaftlichen Wachstums von Seiten der Politik und der Wissenschaft erfahren, wird von den Bemühungen begleitet, derartige Agglomerationen als „Metropolregionen“ zu identifizieren und abzugrenzen. Die Studie entwickelt einen theoretischen Rahmen, der die Kooperationen zwischen den Stadtverwaltungen sowohl aus regionalökonomischer als auch aus politikwissenschaftlicher Sicht betrachtet. Dieser Rahmen wird empirisch auf das „Sachsendreieck“ in Ostdeutschland angewendet. Die Ergebnisse zeigen verschiedene Faktoren, die eine intensive Kooperation zwischen den Akteuren der Region erschweren. Politische Implikationen und Folgerungen für künftige Forschung werden diskutiert.

Schlagworte: Polyzentrische Stadtregion, Metropolregionen, Sachsen-Dreieck, Zusammenarbeit, Ballungsraum, Korrespondenz-Analyse

JEL: R12, R53, R58

Political Institutionalisation and Economic Specialisation in Polycentric Metropolitan Regions – The Case of the East-German 'Saxony Triangle'

1 Introduction

The rising attention of politicians as well as scientists in the EU for the large urban agglomerations functioning as national and international economic hubs and growth centres (Kraetke 2007) is accompanied by political efforts to optimize their spatial organisation and to improve their standing in the worldwide locational competition. This trend leads to efforts to identify and to demarcate such agglomerations under the label 'metropolitan regions' ('Metropolregionen'). Unlike the US American SMSAs these metropolitan regions are no statistical units, but are based on voluntary unions of several territorial jurisdictions, including large cities, smaller cities and counties adjacent to them. The actors in such newly defined metropolitan regions usually have the option to respond proactively by means of 'bottom up' initiatives, or, in case of lacking 'bottom up' activities, to react to 'top down' stimuli set by national or regional governments. In this context the very decision at the national level to lay down a certain number of metropolitan regions may work as an initiating 'top down' stimulus.

Starting from an actor-oriented perspective, these political efforts directed to establish metropolitan regions confront the actors in these territorial jurisdictions with new and added challenges. These challenges refer to their capability and propensity for cooperation crossing borders of municipalities as well as of administrative departments. So municipalities find themselves in a situation similar to private firms considering to start network relations with other firms.[1] From this point of view the capability to cooperate represents a basic and scarce resource in the course of constituting a metropolitan region. The reflections to follow will focus on the question what conditions ease or complicate cooperation between municipalities with reference to building metropolitan regions. This question will be exemplified at the metropolitan region 'Saxony Triangle' strived for in the southern part of East Germany comprising the Saxonian cities Dresden, Leipzig, Chemnitz, and Halle in Saxony-Anhalt.

The polycentric structure of the researched 'Saxony Triangle' on the one hand fuels the assumption that in this case the resource of capability to cooperate will play a more critical role in the process of region-building as in monocentric regions. On the other hand

1 „The metropoles have to define themselves as nuclei of regional networks that can reach their goals only in cooperation with the partners in their surroundings" (*Sinz* 2005, p. III; authors' translation).

this polycentric structure involves a potential of economic specialisation processes taking part over time with the possible result of a kind of division of labour between the cities of the metropolitan region. The empirical study will work on both the political and the economic side of cooperation.

The sections of this paper are structured as follows: In Section 2 a conceptual and theoretical framework is developed, and some factors conducive and obstructive to cooperation are discussed. In Section 3 the process of region-building in the 'Saxony Triangle' is compared with a sequence of typical steps having been passed through in other European metropolitan regions. Section 4 presents the results of an analysis of processes of economic specialisation within the 'Saxony Triangle'. The conclusions in Section 5 centre around the question if there are political options to speed up the process of region-building on the metropolitan level.

2 Synergy Potentials in Polycentric Metropolitan Regions

2.1 Regional Economics

From the view of regional economics the concept of metropolitan regions presents itself as a political construct aiming to intensify (positive) agglomeration effects and to make them effective for a larger region beyond the administrative borders of the agglomerations themselves. These two targets of intensification and extension are based on the assumption that agglomerations as a rule involve a potential of agglomeration effects still unrealized (1) in size and (2) in range. The special quality of an agglomeration serving as a centre for a metropolitan region can be estimated in relation to the degree of spatial concentration of specific functions. Metropolitan regions distinguish themselves (Blotevogel 2002) by serving

(1) as centres for economic and political decision and control. This function becomes visible by a relatively high number of firm headquarters, governmental institutions, and administrative institutions with large jurisdictions and/or outstanding spheres of responsibility located in an agglomeration.

(2) as centres for economic and social innovation and economic competition. This function is dependent on the existence of private firms and science institutions practicing research and development (R&D) as well as on the existence of wholesale markets, stock exchanges, trade fairs, exhibitions and convention centres. Institutions like these serve as market places, as nodes for the exchange of information and as opportunities for networking.

(3) as gateways that relieve a) the access to people, knowledge and markets beyond the metropolitan region, and b) the access to the metropolitan region for visitors attracted by the kind of markets, fairs and other nodes mentioned in (2). This function requires the endowment with large scale transport hubs, with infrastructures relieving the switch between different transport modes, and with modern information and communication technology.

These functions are not independent, but are interconnected by feedback loops. From the view of regional economics the functions can be conceived as indicators for agglomeration effects. For each of them hypotheses can be stated: The more pronounced the respective function in a metropolitan region, the more it supports the emergence of agglomeration effects. In addition to that the functions contain some important information how good (or bad) a metropolitan region is endowed with some locational factors being relevant for the region's standing in international locational competition.

In regions with only one large agglomeration there is a high propensity that these three functions will be spatially concentrated within the agglomeration. As a consequence of this dominant position many smaller cities and counties surrounding the agglomeration will serve as locations for complementary economic and social activities that are intensely interconnected with those in the agglomeration. This position of dependence favours a 'natural' leadership of representatives of the agglomeration when decisions and problems in regional and economic development have to be met, e.g., in the case of taking steps to bring a metropolitan region into existence. These favourable preconditions tied to a basically monocentric structure do not exist in the case of regions structured in a polycentric manner. The challenge of an adequate governance for polycentric regions has created in recent years a rich literature on this topic (Lambooy 1998; Kloosterman 2001; Herrschel and Newman 2002; Meijers and Romein 2003; Bailey and Turok 2004; Meijers 2005; Hall and Pain 2006; Green 2007; Knieling et al. 2007; Meijers 2008). In addition to that EU-funded research in the PolyMETREX (METREX 2005) and the ESPON network (ESPON 2006) has equally contributed to it.

From a regional economist's perspective cooperation in a polycentric region is a special (another) case of a multi-actor network. Lasting cooperative network relations can evolve, if there are gains from cooperative behaviour in comparison to non-cooperative behaviour. Meijers (2005, p. 768 f.) sees potential gains (synergies) stemming from two kinds of networks: club networks and web networks (Capineri and Kamann 1998).

- The members of a club network cannot attain their goals by isolated action, but are dependent on pooling their resources with other actors. This kind of 'horizontal synergy' comes from economies of scale (Capello and Rietveld 1998) and from aligning actions to common goals.

- Web networks are characterized by actors differing in their activities. But these action are related in a complementary way, a typical trait of production chains and value added chains. The resulting 'vertical synergy' results from specialisation and from redistribution of activities between the network members according to their competences. This means, actors concentrate upon their core competences and draw back from other energy absorbing activities.

Cities in polycentric regions have the option to establish both kinds of networks. They can build club networks, if cities with similar profile are pooling their resources, e.g., in city tourism, or in offering common vocational training for industries coining a region. Camagni and Salone (1993) call these types of cooperation synergy networks. The cities of polycentric regions can also organize themselves in form of club networks or complementarity networks (ibid.), if the participating cities have different economic functions and/or dispose of complementary infrastructures. Referring to the gateway function mentioned above, the establishment of a set of complementary infrastructures may become an important development stage in a polycentric metropolitan region.

In establishing complementarity the cities as a rule are dependent on other actors like private firms, universities, chambers of industry and commerce, and trade associations. So the process of realigning the profiles of universities within a metropolitan region, for instance, can only succeed if the heads of the universities are willing to involve in the initiative for a respective metropolitan region (Meijers and Romein 2003). Various factors affecting the capacity to negotiate between actors with divergent interests and to initiate cooperation are discussed within the domain of political science (see Section 2.2 below).

Beyond political activities pursuing the target of complementarity in a certain domain economists since Adam Smith emphasize that complementary economic structures can also evolve by means of division of labour. Some kind of spatial division of labour takes place in form of the specialisation and spatial concentration of industries (Marshall 1920; Weber 1909). Meijers points out that "one of the ideas behind the polycentric urban region concept is that it is not one city that provides a complete array of economic functions, urban facilities or residential and business environments, but rather the whole system of cities within a region" (2005, p. 770). From this view complementarity is linked with agglomeration economies, because economic actors can choose from a more specialised and diverse collection of urban functions (ibid.). Such benefits of agglomerations comprise a larger labour market, the use of shopping and entertainment facilities, and a bigger supply on business service. Thereby the spatial-structure of the polycentric region may avoid the same common disadvantages of agglomerations, e.g. high land or congestions costs (Parr 2004). The complementarity approach will be continued in Section 4 below.

2.2 Political Science

From the perspective of political science metropolitan regions represent constellations of actors at different territorial levels and societal spheres trying to develop and to elaborate a base for cooperative behaviour. The core is constituted by municipal corporations and from case to case supplemented by actors a) from the Länder level, b) from chambers and associations with territorial spheres of responsibility transgressing those of the municipal corporations, and c) from representatives of regionally important institutions (large companies, universities, air ports, trade fair organizers).

A prerequisite for to make such constellations enduring and capable of acting is the actors' willingness to cooperate. Cooperation is the generic term for various forms of action as – listed from the least costly to the most costly one information exchange, discussion and agreement about common goals, coordinated action, conclusion of agreements, pooling resources as a prerequisite for collective action, and the professional representation of common interests in diverse policy arenas.

A screening of a variety of political processes aiming at politically legitimate representations of metropolitan regions in several European countries (cf. KoRiS et al. 2005, pp. 61-69; Knieling et al. 2007, p. 59 ff.) shows typical steps and phases illustrated in Figure 1. The starting point is an initiating 'top down' stimulus, usually set by the Federal or the appropriate Land government, or a 'bottom up' stimulus by some actor(s) of the metropolitan region. In the course of several meetings, taking place with an increasingly constant circle of actors and with increasing regularity, the participants move on to first steps of institutionalisation. The four following steps of institutionalisation (I-IV) in Figure 1 distinguish themselves by intensity and thematic range of cooperation and the degree of delegating tasks to professional expertise.

The model illustrated in Figure 1 is a trial to emphasize the similarities in various political efforts to build metropolitan regions in Europe. Its nature is primarily descriptive, and it is not demanding to serve as a 'best practise' model. Special conditions may bring a hold to the process or may, in the contrary, lead to a leapfrogging of certain steps. Nevertheless a model like this one can help to estimate the progress of a metropolitan region regarding the development of regional governance.

In the scholarly discussion focused on obstacles for regional cooperation the dimension of monocentricity – polycentricity plays an important role (Meijers and Romein 2003; Göddecke-Stellmann et al. 2005). Metropolitan regions with monocentric structures are in the comfortable situation to dispose of an actor with high political importance and with leadership potential and legitimation in activation processes. Beyond that monocentric metropolitan regions have the starting advantage that the name of the dominating centre also serves as 'brand' for the region with the effect that tedious and conflict-ridden discussions become unnecessary how to name the metropolitan region.

Polycentric regions can be differentiated in regions with and regions without an outstanding centre (Knieling et al. 2007, p. 32 f.). While the first ones find themselves in a situation comparable to monocentric regions, the last ones dispose of the least favourable preconditions for joining forces in a metropolitan region. This does not only relate to the region's branding, but also to the problem of taking a leadership role. In addition to that there is a high probability that the region will dispose of several large hub infrastructures of the same kind, e.g., air ports or railway stations. This fact complicates successful negotiations concerning the spatial bundling of these infrastructures and/or decisions to carry on one of them at the expense of other ones.

Figure 1:
Ideal type model for the sequence of cooperation steps leading to intensified cooperation of actors in metropolitan regions

Initiative	Time axis	Type/Form of cooperation
'Top down' or 'bottom up'	Starting phase ↓	Meetings of representatives of various municipal corporations exchanging information and mutual settling of interests
In case of ‚top down' gradually devolving upon the actors of the region		Regular meetings with a steady circle of participants (eventually supported by occasional meetings of the mayors)
Gradually devolving upon managers of important institutions within the metropolitan region	First signs of institutionalisation	Founding of working groups related to specific topics
		Members of the working groups start to networking with representatives of other metropolitan regions
		Inclusion of the municipal departments for economic development in the working groups
		Common actions concerning the marketing of the region
	Institutionalisation I	Founding of an office with cost-sharing between the actors of municipal corporations
	Institutionalisation II	Founding of an agency for economic development acting for the complete metropolitan region
	Institutionalisation III	Agencies and representatives of the metropolitan region start to advocate interests of singular municipal corporations Drawing up of programmatic concepts for regional traffic, housing, etc. with high binding force for all actors
	Institutionalisation IV?	Election for representatives of the metropolitan region? Merger of municipal corporations of the metropolitan region?

Source: Authors' compilation.

In countries with a federal organisation the existence of Länder borderlines can turn out to be an additional complicating factor for cooperation within the frame of a metropolitan region. In Germany a number of metropolitan regions comprise cities and counties located in different Länder. On the one hand this fact reflects entwinement relations exceeding administrative borders. On the other hand it can complicate negotiations be-

tween the actors of affected metropolitan regions, e.g., when they have to consider differing laws or when decisions on the (inter-)municipal level have to be confirmed by superordinate authorities at the Länder level. Frequently there is legal uncertainty in the ways municipal corporations can pursue cross-border activities on their own. There is a high probability that the existence of Länder borderlines will increase the number of actors and the number of diverging interests in the process of building a metropolitan region.

In the next section the 'Saxony Triangle' metropolitan region will be explored with regard to the step model illustrated in Figure 1, and the factors discussed above conducive and obstructive to cooperation.

3 The 'Saxony Triangle' as a Nascent Polycentric Metropolitan Region

The polycentric structure of the region is primarily constituted by four large cities: Leipzig and Dresden as the dominant agglomerations are half-million cities with nearly equal population size (cf. Table 1), Chemnitz and Halle are around half of this size. Dresden is not only Saxony's capital city, but also the city with the highest GDP in absolute and relative terms, with the highest GDP growth since 2000, and with the lowest unemployment rate. The importance of the economic activities concentrated within these cities of the metropolitan region illustrates their output amounting to 38.8 per cent of the GDP of Saxony, and for Halle to 11.0 per cent of that of Saxony-Anhalt (Table 1).

Table 1
Basic economic indicators for the large cities of the metropolitan region ‚Saxony Triangle'

Indicator	Leipzig	Dresden	Chemnitz	Halle
Population 2006	506,578	504,795	245,700	234,295
Net migration 2006	4,939	9,405	324	-1,425
GDP 2006 (million Euro)	12,875	14,822	6,573	5,343
GDP proportion of the Land (%)	14.6[a]	16.8[a]	7.4[a]	11.0[b]
Change in GDP 2006-2000 (%)	20.9	29.7	14.7	6.9
GDP per head 2006 (Euro)	25,506	29,617	26,710	22,586
Unemployment rate 2006 (%)	20.8	16.1	18.2	18.1

[a] Related to Saxony. – [b] Related to Saxony-Anhalt.

Sources: Statistical offices of the Länder; authors' calculations.

The political decision to designate the 'Saxony Triangle' as a potential European metropolitan region (Figure 2) goes back to the 'conference of the German Länder ministries of spatial planning' in 1995 (Knieling et al. 2007, p. 2). First concrete political steps in the form of a top down stimulus set by the Saxonian ministry of the interior led to the foundation of a working group 'Metropolitan region Saxony Triangle' in 2003 with representatives from the largest Saxonian cities Dresden, Leipzig, Chemnitz, and from the ministry as members. In 2004 the city of Halle and the appropriate ministry in Saxony-Anhalt were incorporated in this working group (ibid.).[2] In 2005 the working group decided to club together for an own office. The office location should change periodically from city to city. EU funds allowed the working group to finance a concept for strategic action for the metropolitan region (KoRiS et al. 2005). Activities like these pushed the

2 Representatives of the fourth largest Saxonian city of Zwickau also belonged to the circle of founding actors. Because of its relatively small size (pop. 97,000) this city will not be included in the analysis of Section 4.

process of region-building in a relatively short period to the stage of 'Institutionalisation I' specified in Figure 1. Cooperation took place in the framework of an inter-city network comprising activities like editing brochures informing about the metropolitan region, common marketing in city tourism, or common stands at real estate exhibitions (Knieling et al. 2007, p. 2). At this period the circle of actors was restricted to employees of the municipal authorities and did not include, e.g., managers of private firms, representatives of the chambers of industry and commerce, or heads of universities.

This process was disturbed by a further top down intervention in the form of a recommendation articulated by the 'conference of the German Länder ministries of spatial planning' in 2005 to enlarge the 'Saxony Triangle' by the cities Magdeburg and Dessau (both in Saxony-Anhalt) as well as the cities Gera, Weimar, Jena and Erfurt in Thuringia, all of them located in Central Germany ('Mitteldeutschland').[3] This intervention resulted in several side effects: The pathway to enduring cooperation became more complicated because of a higher complexity implied by a) the (new) region's intensified polycentric structure, and b) the inclusion of cities from a third Land with a differing body of law. The reference to the region of Central Germany points to the problem that in this part of Germany besides the metropolitan region a competing concept exists how to demarcate and to define the region in an adequate way.[4]

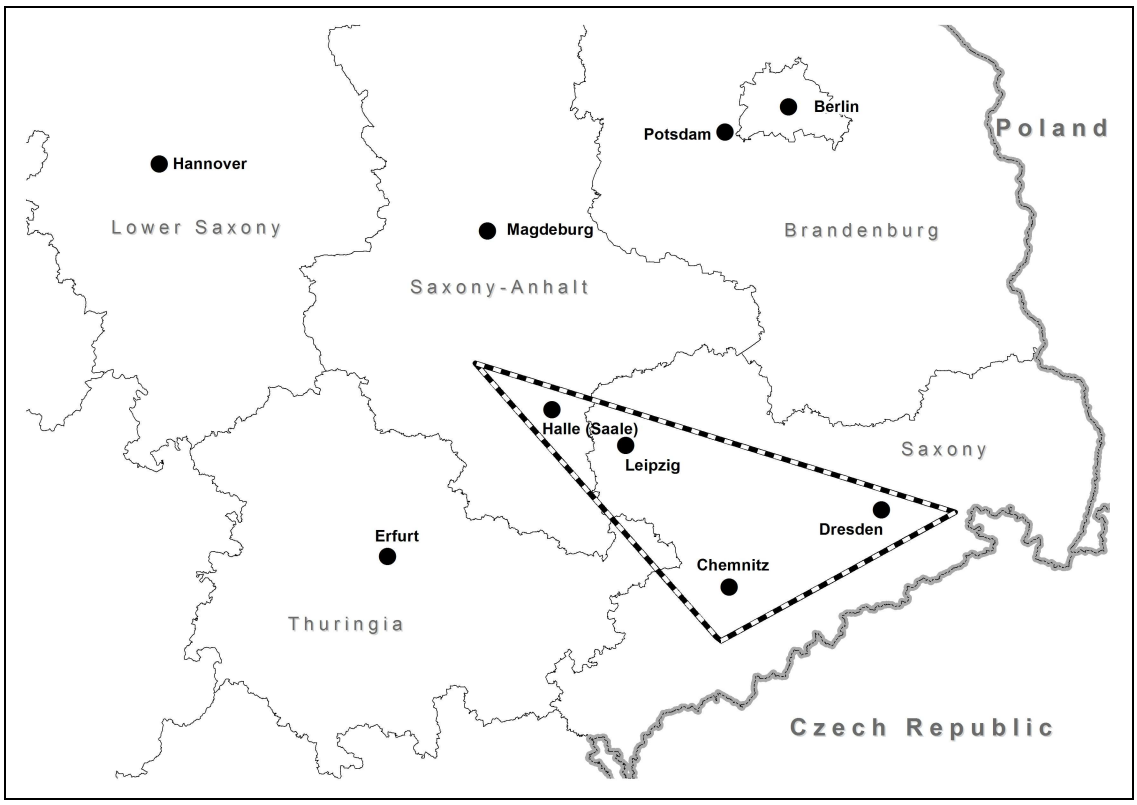
In 2008 the process of a nascent metropolitan region is still getting stuck at the 'Institutionalisation I' stage (Figure 1). The office of the 'Saxony Triangle', since 2008 located at Chemnitz, is now directed by a full-time manager, but there are few signs that cooperation between the actors has intensified since 2005. Mental reservations concerning cooperation of the cities' economic development departments seem to be a crucial point: The East German cities, having regained political autonomy not until 1990, since then experienced a period of severe loss of its economic base and subsequent intense locational competition for newly investing enterprises. Against this background it becomes understandable that local promoters of urban economic development perceive the request to more cooperation as imposition, as long as they feel capable to improve the economic standing of their city by means of intensified city marketing and investment incentives. This barrier for cooperation may gradually diminish in the course of success-

3 "The concept of metropolitan regions is a special chance for the economic area 'Central Germany' to position itself in the international locational competition. For this purpose the 'city chain' in Thuringia and the central places in Saxony-Anhalt should be integrated into the development of the metropolitan region Halle/Leipzig-Saxony Triangle." (Resolution of the 32. Conference of the ministries for spatial planning at Berlin, 28/04/2005) (authors' translation).

4 Because of the East-West partition of the German territory during the period 1949-1990 the name 'Central Germany' fell out of fashion. In the late 90s the concept experienced a renaissance, when several large enterprises initiated a regional marketing network called 'Wirtschaftsintiative Mitteldeutschland' (cf. http://www.mitteldeutschland.com/; accessed at 05/02/2009). This initiative came from exactly those actors that are absent in the metropolitan region 'Saxony Triangle'.

ful economic catching-up and open the door for the 'Institutionalisation II' stage listed in Figure 1.

Figure 2:
Geographical location of the German metropolitan region 'Saxony Triangle'



Source: Authors' compilation.

4 Economic Specialisation within the 'Saxony Triangle'

As an indicator for functional connections between the four leading cities of the 'Saxony Triangle', we analyze the economic patterns of the four cities. Specialisations on different sectors provide an indicator for complementary structures and therefore vertical synergies. Each city can concentrate on its specific strength and has more opportunities to generate agglomeration effects. Moreover, the other cities within the metropolitan region benefit from the stronger specialized supply in the particular sectors.

In addition to the analyses of the economic patterns, we also focus on the innovative competences of the cities of the 'Saxony Triangle'. The argumentation is analogical. If each city develops as a centre of competence in a specific technological field, a broad range of specific knowledge is present in the region, which can be seen as a source of complementarity.

4.1 Sectoral Strucure

To record the extend of economic specialisation, we use the number of employees in the various sectors. We differ between 60 sectors, according to the two-digit level of the German classification of economic activities, which meets the NACE Rev.1 classification of economic activities. The data were taken from the German National Employment Statistic, which is structured according the mentioned classification and contains the number of employees at the NUTS-3 level (see Fritsch and Brixy 2004 for a description). This statistic has the advantage, that it records the separate locations of multi-establishment firms. A disadvantage of this data source is that only employees are considered. Freelancers and self-employed persons are not included. Our data set covers the period from 2003 to 2007.

First of all we use the specialisation rate (the ratio of the share of employment in a specific industry in a region in total employment of the region and the share of total employment in the industry in total employment of a larger area, in our case Eastern Germany) to describe the general economic structure of the four cities. A specialisation rate larger than one indicates a relevance of a sector above average in a region. Table 2 presents the industrial sectors in which the different cities are specialised in.

Table 2:
Economic specialisation of the cities of the 'Saxony Triangle' 2006 (only industrial sectors showing a specialisation rate > 1 are listed)

City	Sector
Dresden	• Radio, television and communication equipment (specialisation rate 7,9) • Tobacco products (3,8) • Office machinery and computers (2,1) • Publishing and Printing (1,4) • Other transport equipment (1,1) • Medical, precision and optical instruments, watches and clocks (1,1) • Chemicals and chemical products (1,0)
Chemnitz	• Textiles and textiles products (2,4) • Machinery (2,2) • Metal and metal products (1,6) • Radio, television and communication equipment (1,5) • Motor vehicles (1,3) • Publishing and Printing (1,1)
Leipzig	• Motor vehicles (1,7) • Publishing and Printing (1,7) • Metal and metal products (1,0)
Halle	• Publishing and Printing (1,5)

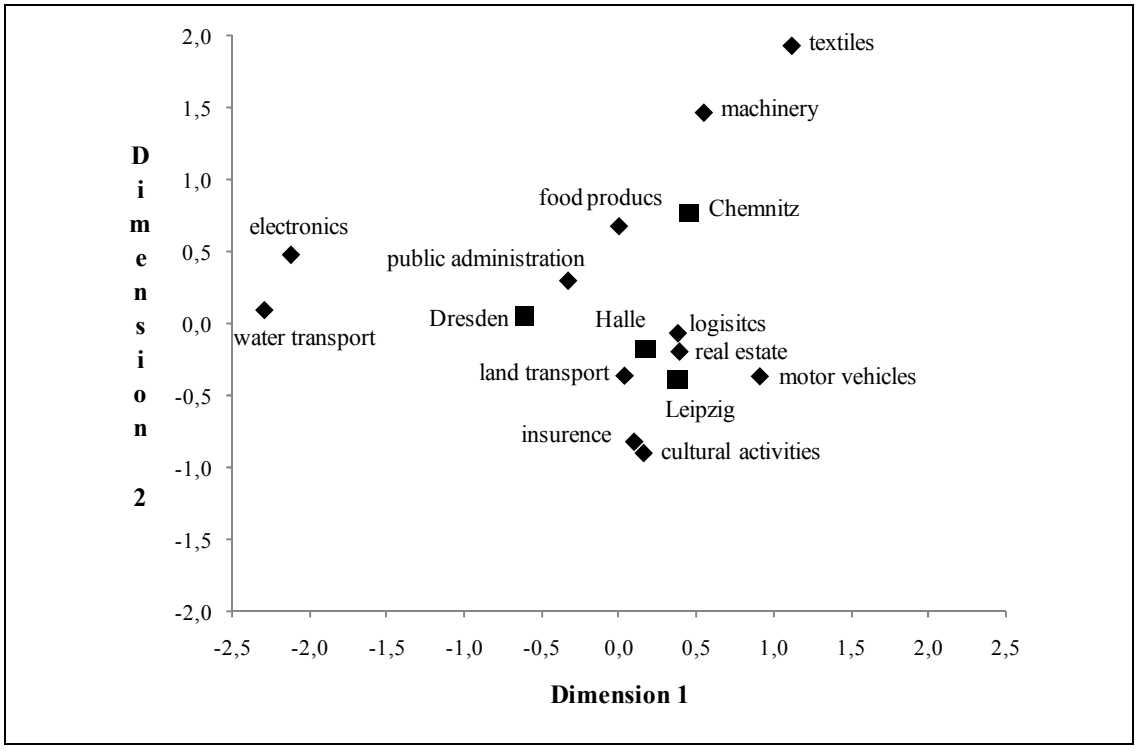
Sources: Federal Employment Agency; authors' calculations.

The results denote strong differentiations between the cities. Since Halle and Leipzig are dominated by the service sector, there are only few industrial specialisations. In contrast, Dresden and Chemnitz show specialisation on several (but dissimilar) industries. The varying economic specialisation implies differentiations in the economic role of the cities of the 'Saxony Triangle'. In addition, we apply correspondence analysis to investigate the varieties of the economic structure of the cities. Correspondence analysis is a kind of correlation analysis, with has the main purpose "to reveal the structure of a complex data matrix by replacing the raw data with a more simple data matrix without losing essential information" (Clausen 1998, p. 1). The association between the considered categorical variables is analyzed by representing the categories of the variables as points in a low-dimensional space. Therefore, a main advantage of the method is the option of a visual presentation of the results, accompanied by a more facile interpretation. Points of a particular set that are close in space represent categories with similar distributions; points far-off represent categories with dissimilar distributions. Moreover, it is feasible to interpret the correspondence between different sets of points. In this case, not the specific distance between points from different sets, but the relative position of a point in relation to any points of the other set should be considered. Besides the geome-

trical display we refer to the concept of total inertia. The total inertia is a measure of variance and quotes the extent to which the profile points spread around the average profile. The higher the total inertia, the higher are the overall differences between the set of categorical variables. For a (non-technical) introduction to the method see Clausen (1998).

In our case, correspondence analysis meets two tasks. First of all, it reveals similarities of the economic structures of the cities of the 'Saxony Triangle'. The relative position of the cities in the presented two-dimensional plots reflects the association of the economic role of the cities. Moreover, we examine the configuration of cities and economic activities. Thereby we identify which tasks are realised in the particular cities. Secondly, we investigate the development of varieties of the economic structure, by comparing the associations between the cities in 2003 and in 2007.

Figure 3:
Varieties of the economic structure of the cities of the 'Saxony Triangle' 2007



Sources: Federal Employment Agency; authors' calculations.

Figure 3 presents the results of the correspondence analysis with the data of the year 2007. The closeness of the points presenting the cities Leipzig and Halle indicates the similarity of the economic structure of both cities. Indeed, both of them are characterised by a domination of the service sector and shows specialisation on insurance, real estate (see Figure 3) as well as finance, education, and health (for clarity not considered in Figure 3). Interestingly, both cities also show a high proximity in geographical terms

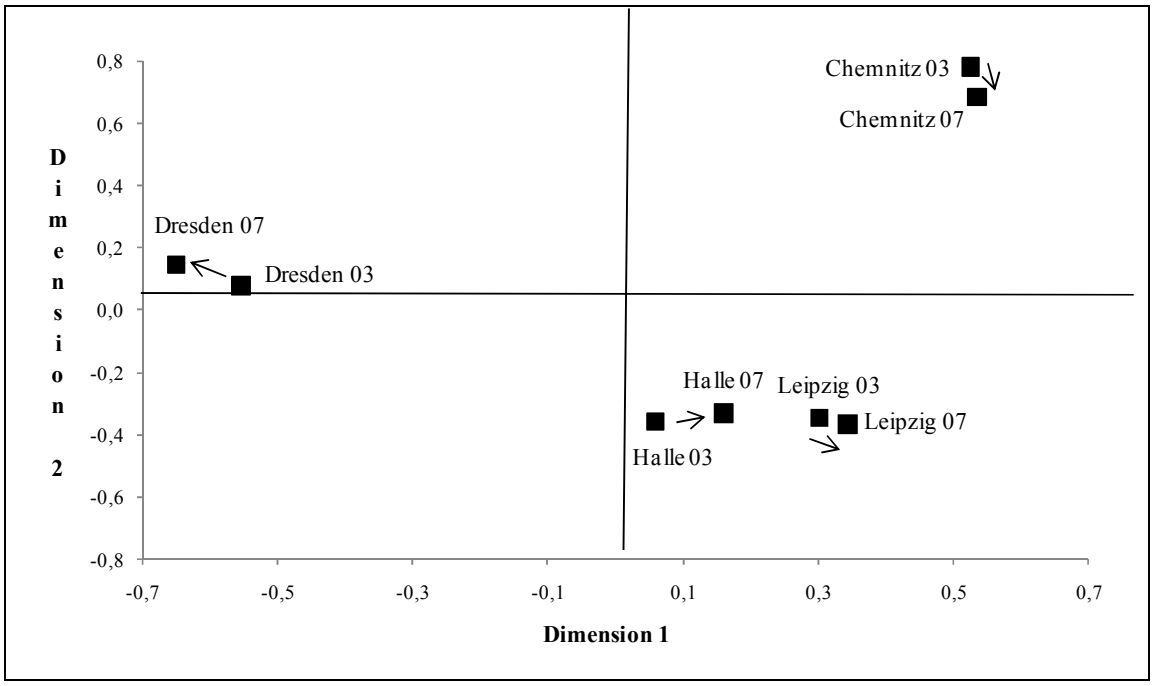
(see Figure 2). That indicates that twin cities like Leipzig and Halle may primarily realise horizontal synergies. Moreover, the two cities are related to logistics and land transport. This is due to the endowment with several motorways. Differences between the cities for example trace back to the role of motor vehicles (BWM and Porsche manufacture in Leipzig) and food production and beverage, which holds a stronger position in Halle.

On the contrary, the cities Dresden and Chemnitz have a more distinct profile. Dresden, already a centre of the microelectronics industry during GDR-times, is specialised on electronics, manufacture of electrical and optical equipment as well as electrical machinery and apparatus. Chemnitz shows similar traditions. The specialisation on the manufacture of textiles and the manufacture of machinery and equipment outlasted the process of economic transformation. In addition, Dresden is the capital of the federal state Saxony and therefore has a strong position in public administration. Due to its location at the river Elbe, Dresden shows the strongest specialisation on water transport.

Figure 4 presents the development of the varieties of the economic structure of the cities of the 'Saxony Triangle' in the recent years. Compared with the year 2003, the economic profiles of the cities became more differentiated in 2007. In particular, the city of Dresden distinguishes. Leipzig and Halle also moved away from the centroid. However, the specific distance between both cities decreased. Altogether, the diversification of the cities advances. The total inertia rises from 0.088 in 2003 to 0.093 in 2007.

Following the idea of Meijers (2005), we normalised the total inertia (complementarity ratio) to allow a comparison of the inertia between different polycentric urban regions. Compared with the results of the study of Meijers (2005) on the larger cities in the Randstad in the Netherlands, the complementarity ratio indicates a lower complementarity of the cities of the 'Saxony Triangle' (complementarity ratio of the Saxony Triangle in 2007: 3,1; larger cities of the Randstad in 2002: 4,9; ibid., p. 775). However, while the development in Randstad shows the tendency of a decreasing complementarity; the cities of the 'Saxony Triangle' have become more differentiated. Comparison with the results of other studies applying correspondence to analyse polycentric urban regions is not feasible, because they consider only selected sections of economic activities (e.g. Meijers 2007, p. 47 f., Meijers et al. 2008).

Figure 4:
Development of varieties of the economic structure of the cities of the 'Saxony Triangle' between 2003 and 2007



Sources: Federal Employment Agency; authors' calculations.

4.2 Innovative Competencies

Besides differentiation in the economic structures, different competencies in technological fields can be regarded as a further source of complementarity. To indicate the innovative competencies of the cities, the number of patent applications in the period from 2000 to 2005 is used (German Patent and Trademark Office 2006). The statistic differs between 31 technological fields, whereas each technological field includes several classes from the International Patent Classification (IPC). Due to the availability of data, the analysis is carried out on spatial planning regions, which covers the urban areas and the surrounding rural districts. We presume, that a spatial planning region has specific innovative competency in a technological field, if the number of patent applications exceeds the number of 50 (Franz 2007).

The range of innovative competencies differs between the cities of the 'Saxony Triangle' (see Table 3 in the appendix, which presents the number of patent applications in the different technological fields in the 'Saxony Triangle'). While in the spatial planning region including the city of Dresden about 3,500 patent applications are registered, the areas of the other cities drop behind (Chemnitz 1,300 patent applications, Leipzig 900, Halle 700). Regarding the technological fields, the region of Dresden shows innovative competencies in 19, Chemnitz in 14, and Leipzig and Halle in 6 of the 31 technological

fields. Thereby we find large intersections. In 14 of the technological fields at least two of the cities dispose of innovative competencies, in 8 technological fields neither city shows innovative competencies. Thus, these results indicate that the cities of the 'Saxony Triangle' have a wide overlapping knowledge base. Since there are only few technological fields where only one city has specific competencies, there is only weak evidence for a complementary structure.

5 Conclusions

In Germany the initial impulse by the EU to identify metropolitan regions at the national level, and to make them capable of acting, especially in converting their endogenous potentials into a surplus of economic growth, led to political activities for region-building in eleven cases. The state of progress made on the political level in direction to this goal differs between the involved regions and is, at least partially, dependent on some framing conditions. In the case of the 'Saxony Triangle' its polycentric structure, the existence of Länder borderlines within the territory of the region, and special conditions tracing back to the re-unification and the economic transition in the 90s have contributed to a relatively slow pace in the process of institutionalising it as a metropolitan region. In addition to this the initiators of the 'Saxony Triangle' have to come to terms with a competing regional demarcation named 'region Central Germany' that is supported by a number of important enterprises and business associations in the region. Altogether, in the case of the 'Saxony Triangle' the main outcome up to now is a well-established network of (few) cities, but with little reach beyond the city level.

Besides the dimension of politics, metropolitan regions may manifest through complementary structures in the field of business and technology. Although the cities of the 'Saxony Triangle' have distinct economic profiles and show an increasing variety in their economic structure in recent years, it remains unclear in which extent the potentials for complementarity are realised. Thereby the valuation of the extent of economic differentiation is hindered, because of the small number of existing comparable studies. Further research should be of comparative nature, to allow a valuation of the degree of economic integration of different metropolitan areas. In particular, a comparison between polycentric and monocentric metropolitan regions regarding their potential complementarity could provide insights into the working of urbanised regions.

Beyond its significance as information about the degree of the cities' economic specialisation and division of labour, the empirical results in Section 4 also are of importance for strategic political action. The spatial concentration of some industries within the metropolitan region may, for instance, become a starting point for strategic realignment of universities by strengthening those fields of study that are relevant for R&D and for the specific human capital demanded by the firms of those industries. To handle decisions of this kind, e.g., strengthening the capacity of some infrastructure at the expense of some other one, a relatively high level of trust between the actors of a metropolitan region is required. The solutions for these win-lose-situations have to be negotiated and cannot be decided upon by mere political power. This bears the risk that the new and fragile 'culture of cooperation' in a metropolitan region would be damaged and future compromise solutions based on cooperation be prevented. A potential way to negotiate such win-lose-situations successfully might be to endow the municipalities engaged in metropolitan region-building from the start with 'transferable development rights' (Frey and Zimmermann 2005). The amount of these rights might be calculated according to

the size of population size and/or the size of the territory available for development. Until now this instrument has been applied in a few cases only in the US, but not in Europe (ibid.). It might be worthwhile to test this instrument in the case of a metropolitan region having already reached at a high level of institutionalisation and stabile relations between its actors.

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Appendix

Table 3:
Innovative competencies in the spatial planning regions of the 'Saxony Triangle'

Technological field	Number of patent application in the period between 2000 and 2005			
	Dresden[a]	Leipzig[b]	Chemnitz[c]	Halle[d]
Electrotechnology	>100	>50	>50	>50
Metering, Checking, Optic, Photo	>100	>100	>100	>50
Chronometry, Control	>100	>50	>50	
Health, Amenities	>50	>50	>50	
Cutting, Mixing	>100		>50	>50
Architecture	>100	>50	>50	
Fermentation, Sugar, Skin		>50		>50
Light, Heater	>50		>50	
Organic macromolecular ties	>50			>50
Metal working, Foundry, Machine tools	>100		>100	
Grinding, Extrusion, Tools	>50		>50	
Conveying, Lifting, Saddlery	>100		>50	
Vehicles, Ships, Aircrafts	>50		>50	
Engineering	>50		>50	
Inorganic chemistry	>50			
Printing	>100			
Textiles			>50	
Metallurgy	>100			
Education, Acoustics, Information storage	>50			
Agriculture	>50			
Organic chemistry				>50
Electronics, Telecommunication engineering	>100			
Prime mover, Engine			>50	

[a] Spatial Planning Region 'Oberes Elbtal/Osterzgebirge' – [b] Spatial Planning Region 'Westsachsen' – [c] Spatial Planning Region 'Chemnitz-Erzgebirge' – [d] Spatial Planning Region 'Halle (Saale)'

Sources: Franz (2007); authors' description.